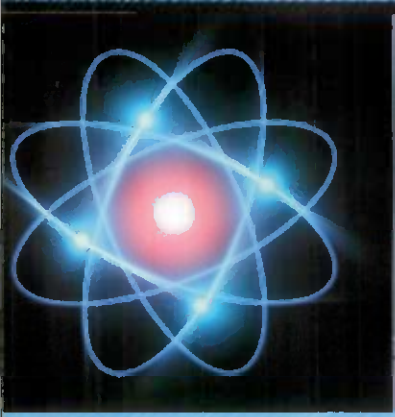
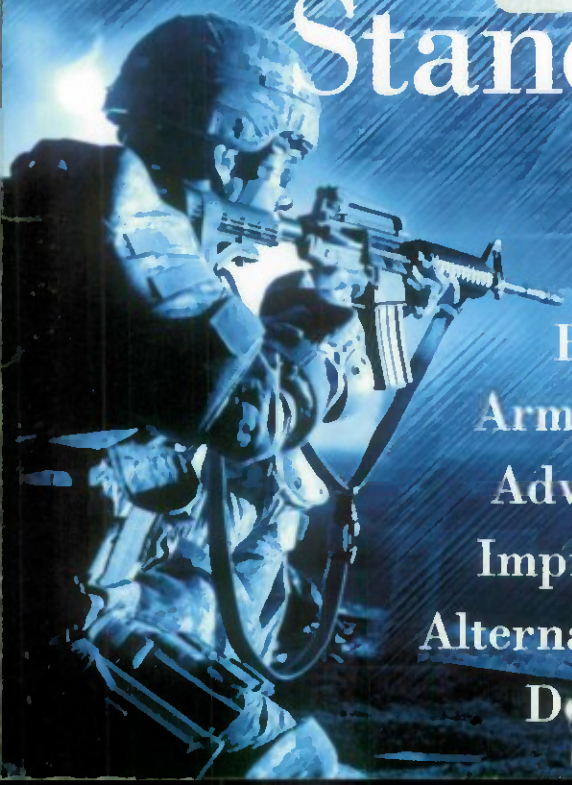
Defense Standardization Program

Journal

January/March 2012



Standardization Stars



Biological Reagents

Armored Military Vehicles

Advanced Tank Coatings

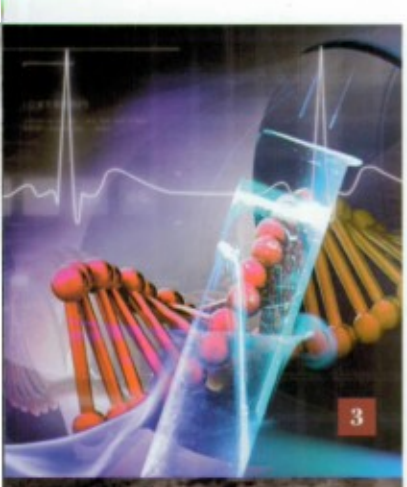
Improved EMF Standards

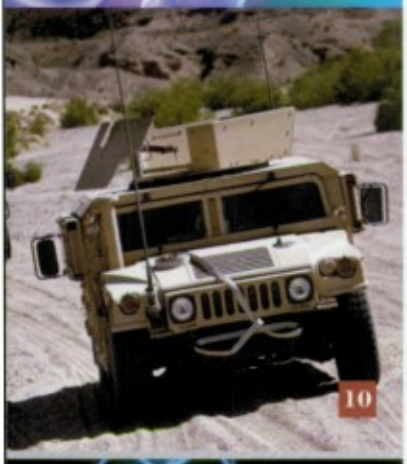
Alternative Sustainable Plating

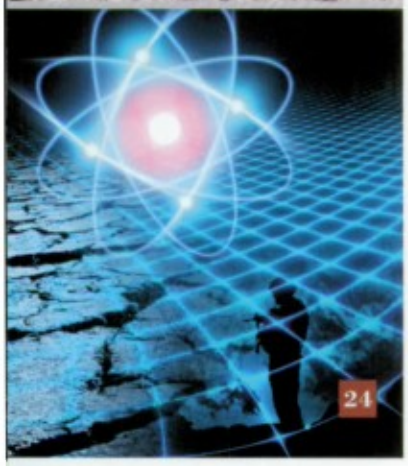
DoD Medical Materiel

Defense Standardization Program
Journal

Contents *January/March 2012*







The *Defense Standardization Program Journal* (ISSN 0897-0245) is published four times a year by the Defense Standardization Program Office (DSPO). Opinions represented here are those of the authors and may not represent official policy of the U.S. Department of Defense. Letters, articles, news items, photographs, and other submissions for the *DSP Journal* are welcomed and encouraged. Send all materials to Editor, *DSP Journal*, Defense Standardization Program Office, 8725 John J. Kingman Road, STOP 5100, Fort Belvoir, VA 22060-6220. DSPO is not responsible for unsolicited materials. Materials can be submitted digitally by the following means:

e-mail to DSP-Editor@dla.mil
CD or DVD to *DSP Journal* at the above address.

DSPO reserves the right to modify or reject any submission as deemed appropriate.

Gregory E. Saunders
Director, Defense Standardization Program Office

Timothy P. Koczanski
Editor, Defense Standardization Program Journal

Defense Standardization Program Office
8725 John J. Kingman Road, STOP 5100
Fort Belvoir, VA 22060-6220

703-767-6870
Fax 703-767-6876

dsp.dla.mil

Director's Forum

Each year, we recognize individuals and teams who, through their standardization efforts, have significantly improved technical performance, increased operational readiness, enhanced safety, or reduced costs.

Individuals and teams are nominated for standardization awards, and we identified six as being particularly deserving of recognition. Through their efforts, sometimes taking several years, the six winners have played an integral part in keeping our men and women in uniform safe and in providing them the tools they need to get the job done.

Standards and standardization link common solutions to common problems across all services and frequently across nations. This issue of the *DSP Journal* showcases the accomplishments of the FY11 award winners.

Congratulations to all of our award winners. I know that DoD leadership appreciates your work. These awards help call attention to the significant contributions that standards and standardization make to supporting our men and women in uniform, helping to multiply capability through interoperability, and saving money for the taxpayer. I hope that reading about their accomplishments will pique your interest and might even inspire you to submit an award nomination on the good work you are doing in standardization.

Gregory E. Saunders
Director
Defense Standardization Program Office

DPMP Defense Parts Management Portal

Defense Parts Management Portal–DPMP

The DPMP is a new public website brought to you by the Parts Standardization and Management Committee (PSMC) to serve the defense parts management community.

The DPMP is a new resource, a new marketplace, and a "one-stop shop" for parts management resources. It is a navigation tool, a communication and collaboration resource, and an information exchange. It gives you quick and easy access to the resources you need, saves you time and money, connects you to new customers or suppliers, and assists you with finding the answers you need.

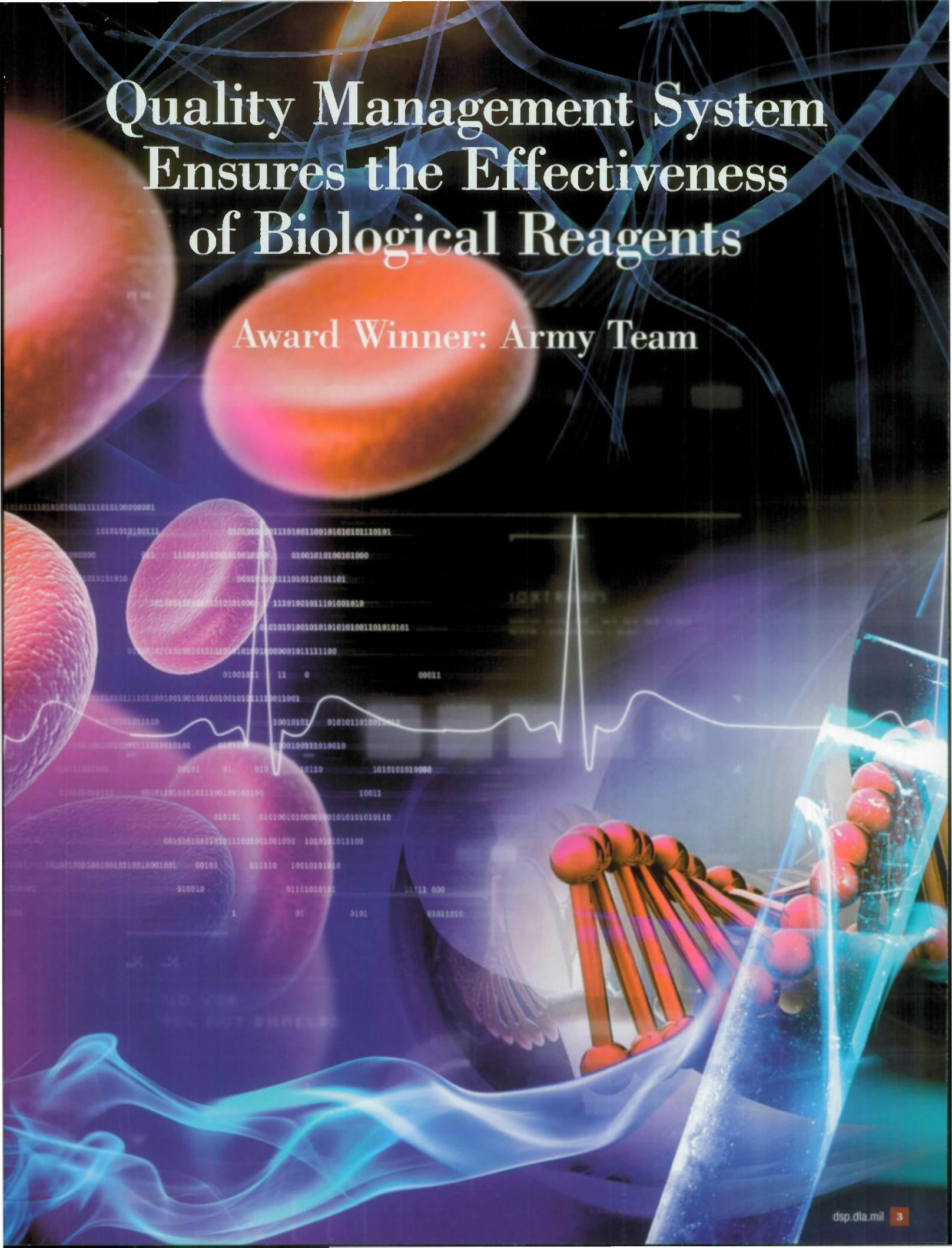
This dynamic website will grow and be shaped by its member organizations. A new and innovative feature of the DPMP is its use of "bridge pages." Organizations with interests in parts and components are invited to become DPMP members by taking control of a bridge page. Chances are good that your organization is already listed in the DPMP.

There is no cost.

Explore the DPMP at https://dpmp.lmi.org. For more information, look at the documents under "Learn more about the DPMP." Click "Contact Us" to send us your questions or comments.

Quality Management System Ensures the Effectiveness of Biological Reagents

Award Winner: Army Team



A team from the BioTechnology Branch of the U.S. Army Edgewood Chemical Biological Center developed a quality management system for the Critical Reagents Program (CRP). The system covers the validation of quantitative measures of biological reagents' biophysical properties and the test and evaluation of manufactured reagents. As a result of the team's work, the BioTechnology Branch was accredited as being compliant with ISO 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories," for three analytical test protocols. In addition, the team developed a web-based database for the CRP and other DoD-approved users to access records and performance data for all reagents available in the CRP inventory. The ISO-compliant quality management system significantly increased the informational content available to the CRP, enabling the CRP to optimize program capabilities and management practices. Optimization of capabilities and practices, in turn, enables the CRP to control costs across the logistics chain while providing high-quality material to joint program managers for fielding reliable and sustainable capabilities. Customer complaints about reagent quality have significantly decreased.

Background

The Critical Reagents Program, under the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD), manufactures, stores (in an antibody repository), and ships antibodies for use by DoD, other government agencies, academia, and the private sector to support the research, development, test, and evaluation of detection and diagnostic platforms across the biodefense mission space. Antibodies are used to detect and identify biological threat agents in such programs as Joint Portal Shield, Biological Integrated Detection System, Joint Biological Point Detection System, Joint Biological Tactical Detection System, Joint Chemical Biological Radiological Agent Water Monitor, and Joint Biological Agent Identification and Diagnostic System.

Antibodies can be produced in many different forms: monoclonal or polyclonal, single chain or fragment, native or recombinant, and so on. From their origins in complex biological systems, antibodies can exhibit varying behaviors or properties in solution depending on temperature, buffer, concentration, and acid-base level. The utility of an antibody in a given diagnostic or detection platform depends on having assurance that its biophysical properties are within a fixed parametric range, which will accurately predict its functional properties in the end-use scenario.

Historically, CRP's characterization of antibodies was limited primarily to comparing their relative performance to a gold-standard antibody in an enzyme-linked

immunosorbent assay. If the test antibody performed poorly, the CRP had no way to determine why it failed. Therefore, the only conclusion to be drawn was that the production lot was bad and had to be replaced, at significant time and cost.

The BioTechnology Branch, in consultation with the CRP, proposed that more extensive testing and characterization of the biophysical properties of an antibody production lot could provide significant data that could support earlier decisions about whether a production lot should be accepted or rejected. The data analysis could also provide an opportunity to address antibody deficiencies in "the tube" rather than remanufacturing the whole lot.

Problem/Opportunity

Both the CRP and the BioTechnology Branch recognized that existing antibody test protocols were insufficient to resolve customer complaints that the antibodies they received did not perform to expectations and were "not good," or that antibody performance varied too greatly from one production lot to another. In addition, multiple sources were producing antibodies and submitting them to the CRP for evaluation. The availability of numerous antibodies, coupled with the market demand for guidelines to determine which reagents were "best," magnified the need to

- create a set of standardized protocols for analyzing every reagent in the CRP antibody repository and
- define the acceptance criteria for releasing new production lots into the distribution channel.

The team defined the problem as a basic deficiency in quality control and seized the opportunity to develop an ISO-compliant quality management system that would enable the CRP to better serve its customers, as well as to be competitive in both the government and private sectors where a rigid standard of quality (good laboratory practice, good manufacturing practice, ISO accreditation) is required. The team also identified the need for a readily accessible database of reagent characteristics to provide CRP program managers and approved users with daily updates on new analytical reports and inventory levels.

Approach

The BioTechnology Branch began this project by hiring a quality manager to do the following:

- Establish the quality documentation requirements.

- Write the quality and technical documents.
- Train the technical analysts.
- Ensure that all aspects of the ISO standard were addressed, as well as any additional requirements from the third-party independent auditor.
- Ensure that all equipment was on an established service and maintenance schedule.
- Work with the branch chief, antibody manager, and technical expert (principal investigator) in establishing what test methods would be of most benefit to the CRP and its customers.

The team chose three test methods for ISO accreditation:

- Nanodrop—a spectrophotometric measure of concentration
- Experion—an electrophoretic measure of molecular weight and purity
- Dynamic light scattering—an optical measure of monodispersity in solution.

The quality manager defined the general requirements, and the technical expert determined the technical specifications. The team used a standardized format for all technical documentation and wrote procedures in sufficient detail so that someone could learn to perform the tests with little formal training and supervision. All team members reviewed each technical document and provided input to arrive at a consensus on the required detail for each task. Each test method was validated (installation qualification, operational qualification, and process/performance qualification) to support the implementation of the process or equipment.

Outcome

The payoffs from this standardization initiative have been tangible and substantial. The primary objective was to reduce the number of customer complaints about antibody quality and activity. Because the CRP can now provide standardized test reports and a certificate of analysis for each antibody it ships, CRP's customers have been less inclined to question the quality of material and focus more on their individual protocols.

The quality program has also directly reduced costs associated with replacing production lots of low-quality material. With replacement costs of $100 per milligram, having to remanufacture just 1 gram of antibody due to quality issues costs the CRP $100,000—money saved if the CRP rejects the production lot on delivery and the manufacturer holds the risk. With inventory volumes commonly exceeding 5 grams (5,000 milligrams) per antibody, and the CRP selling antibodies for as much as $700 per milligram, the potential market value of the CRP inventory is easily hundreds of millions of dollars.

The ability to accurately and reliably evaluate antibody production lots and to establish solid criteria for acceptance—rather than the previous criterion of waiting for customer complaints—provides the CRP with the critical decisional analysis tools to accept or reject new batch production lots and to evaluate existing inventory for deterioration.

Establishing the electronic database of antibody properties for the CRP has also substantially improved the ability of the CRP to efficiently manage the antibody inventory. CRP program managers receive daily updates of inventory levels, and they can review new test reports when filed, as well as shipping reports. In addition, the CRP can give others access to the database, enabling them to view the inventory without delays due to missed phone calls, out-of-office replies, and unread e-mails.

The value of the BioTechnology Branch's antibody quality management system and its standardized testing has also been recognized by others. The Defense Advanced Research Projects Agency selected the BioTechnology Branch as its independent test laboratory to evaluate methods for improving antibody stability and affinity in its Antibody Technology Program ($2.5 million over 2 years), and the Defense Threat Reduction Agency's Joint Science and Technology Office has provided the BioTechnology Branch with $650,000 over 2 years to develop and validate new methods for characterizing antibodies for the CRP.

Current Status

A quality management system is never complete, and the need to strive for continuous improvement is unending. In the initial effort, the team achieved its goal of developing and implementing a quality system that received ISO 17025:2005 accreditation for three test methods and established a web-based CRP antibody database that is accessible worldwide for authorized users. In FY12, the team plans to add at least two antibody test methods to the scope of accreditation.

In addition to the antibody repository, the CRP maintains a genomics repository. The team plans to follow its template for antibody standardization and database development to create a similar web-based database and quality management system for the genomics repository.

Challenges

The biggest problem in implementing the CRP quality management system was changing the mindset of laboratory scientists trained in basic research to shift their focus from doing what they thought was right, based on years of experience, to focusing on meeting the exacting day-to-day requirements for documentation and accurate record keeping required by the ISO-compliant quality management system. Researchers learn to be creative, to try something different, to change variables, to tweak the instruments, and to look for constants across experimental variations. In the quality management system mindset, variation and individual differences in methods and techniques are not tolerable. A researcher is not left to wonder how something should be done; the steps are all written down in exacting detail to be repeated exactly from one researcher to the next. Once the scientists learned to distinguish between the activities required by the quality management system and their other research activities, they became much more accepting and eager to participate.

Another challenge was providing easy access to the antibody database users. Access would have to be on a secure site, would ideally be accessible by logging in using a common access card, and would require additional user authorization. The team initially populated the database in a software inventory program called BioTrac. Subsequently, the team converted it to a Microsoft Excel file and then, as the database's volume and complexity grew, converted it to an Access file. The final solution arrived with the assistance of the JPEO-CBD information technology team, which adapted the database to its SharePoint website and linked it to the Joint Acquisition Chemical Biological Radiological Nuclear (CBRN) Knowledge System—usually referred to as JACKS. The database will continue to evolve with each addition of a new antibody reagent and standardized test reports.

About the Award Winner

The Army team consisted of Roy Thompson, James Carney, Darrel Menking, Heather Welsh, and Melody Zacharko.

Roy Thompson is chief of the BioTechnology Branch, with responsibility for both administrative matters and technical operations. The BioTechnology Branch houses and maintains all physical facilities of the CRP repository. He assisted the team with all internal and third-party audits and participated in management reviews. In addition, he reviewed and approved every quality and technical document, as well as validation protocols in the quality management system.

James Carney served as the technical expert on the team. His contributions included working with the branch chief to choose the test methods to be candidates for accreditation and establishing detailed specifications for each test method. Dr. Carney also was directly involved in reviewing, editing, and approving the quality and technical documentation. In addition, he had a lead role in investigating root causes and defining corrective actions for all technical issues.

Darrel Menking manages the antibody repository. He reviewed, edited, and approved all of the quality system documentation; participated in management reviews; and was directly involved in all corrective and preventive actions. Mr. Menking was essential in setting up all the contracts to service and calibrate the analytical equipment, as well as all maintenance of the mechanical systems supporting the CRP.

Heather Welsh is an analyst and the deputy quality manager. She reviewed and provided valuable feedback on all quality and technical documentation. In addition, Ms. Welsh was trained in all three test methods and participated in installation, operational, and process/performance validations. She also led root-cause analyses and developed corrective actions. She was a vital member in all internal and third-party audits and participated in management reviews.

Melody Zacharko, the quality manager, is responsible for ensuring CRP's compliance with ISO 17025:2005. Ms. Zacharko's duties on the team developing the quality system included creating quality, technical, and validation documentation; leading management reviews and root-cause analyses; and organizing internal audits and serving as the point of contact for the third-party accreditation body. She also was key in establishing the antibody database and coordinating with the JPEO-CBD for its web publication.

New Lightweight Aluminum Alloys Qualify to Armor Military Vehicles

Award Winner: Army Team

A team from the U.S. Army Research Laboratory, Weapons and Materials Research Directorate, used five newly developed lightweight aluminum alloys to create acceptance criteria for quantifying new properties that included improved ballistic performance, corrosion resistance, and weldability. To support the implementation of the new alloys, the team modified one specification and developed three new ones. While developing these documents, the team worked closely with several programs that use lightweight armor materials, such as the Program Executive Office Ground Combat Systems (PEO GCS), Program Executive Office Combat Support and Combat Service Support (PEO CS&CSS), and program managers (PMs) for platforms such as the Heavy Expanded Mobility Tactical Truck (HEMTT) A4, RG-33 family of Mine Resistant Ambush Protected (MRAP) vehicles, and the M1114 and M1151 High Mobility, Multipurpose Wheeled Vehicles (HMMWVs). Having the additional specifications will reduce the likelihood of shortages in aluminum alloy armor plate. Moreover, use of the new, more capable aluminum alloy armor will save more lives at a lower cost. For the HEMTT A4 alone, using a lighter armor resulted in a 3-year cost savings exceeding $16 million.

Background

The U.S. military began investigating aluminum alloys in the early 1930s, and it began using aluminum alloys for armor soon after the United States became a combatant in World War II. Through the war years, the demand for aluminum alloy armor increased due to its successful ballistic performance and the need for lightweight materials for weight-critical applications, such as aircraft and body armor.

After World War II, the military began evaluating heavier gage aluminum alloy plate for vehicle armor and studying welding techniques for high-strength aluminum alloys. The Army published the first general wrought aluminum alloy armor plate specification—MIL-A-46027—in March 1959. That version covered one aluminum alloy, Al 5083. Production of the first full-track personnel carrier armored with A1 5083, the M113, began in 1960. Details about a second alloy, Al 5456, were added to MIL-A-46027 in 1964. Al 5083 and Al 5456 are considered the first-generation aluminum alloys for armor.

The Army next focused on developing a second-generation aluminum alloy with greater ballistic resistance for use on the XM551 Sheridan tank. Researchers identified Al 7039, a heat-treatable, weldable wrought aluminum-zinc-magnesium alloy armor plate and documented its characteristics in MIL-A-46063, published in August 1963. However, the Army quickly found that Al 7039 is susceptible to stress corrosion cracking (SCC).

Since the early 1970s, the Army has worked to develop processing techniques and new aluminum alloys that have even better ballistic performance and mechanical properties

than Al 7039 and SCC resistance equal to that of Al 5083. In 1979, Al 2519 became the third-generation aluminum alloy armor. Al 2519 was subsequently tested as a candidate material by several Army programs, including the Expeditionary Fighting Vehicle Program, which successfully used Al 2519 for its hull. MIL-A-46192 (MR), published in 1986, documents the chemistries and other characteristics of Al 2519. However, to overcome the corrosion susceptibility of Al 2519 in a saltwater application, an extensive evaluation of the coating systems was required to develop a surface preparation, pretreatment, and coating system.

Problem/Opportunity

The conflicts in South West Asia resulted in a significant increase in the demand for aluminum alloy armor for military vehicles and platforms. The demand has been driven by the excellent performance of aluminum alloy armor plate against multiple hits from fragments and bullets, as well as by the low-cost, excellent fabrication capability and commercial availability of the alloys. However, this demand could not be fulfilled with the lightweight armor alloys as characterized in current military specifications. Therefore, additional alloys for lightweight armor applications were required.

Approach

To increase the availability of lightweight armor materials for procurement and implementation on military platforms and vehicles, the Army team investigated, or reinvestigated, a number of commercially available aluminum alloys. The team also sought alloys with improved ballistic properties and enhanced corrosion resistance.

The team worked directly with programs that use lightweight armor materials to ensure their requirements would be met. Below are some examples:

- The M1114 and M1151 HMMWVs use a 1.5-inch aluminum alloy armor plate as part of the ballistic design.
- Two tactical truck systems—Family of Medium Tactical Vehicles and HEMTT A4—use 1.50-inch, 2.00-inch, and 2.25-inch Al 5083 plates for the add-on "B" kits.
- The Stryker Family of Vehicles and the HEMTT A4 require lightweight materials for mine protection kits (MPKs).

The team reviewed and tested the various compositions and properties for all of the candidate aluminum alloys, carried out ballistic and mechanical tests, and assessed for weldability.

As acceptable alloys were developed or identified, the team documented their specific chemistries and technical aspects of their production in draft specifications. The team co-

ordinated multiple drafts of the specifications with industry and government representatives and documented all the comments received. The team then reviewed each comment and decided, by consensus, whether to accept or reject the comment or to reword part of the comment for inclusion in the next iteration of the draft. Once consensus on the draft specification was achieved, the specification was published.

Outcome

The team developed and qualified five aluminum alloys—Al 7085, Al 2139, Al 2195, Al 6061, and Al 5059—for use in military applications and incorporated them in four specifications, three new and one updated. Having the additional specifications will reduce the likelihood of shortages and will prevent spikes in the prices of aluminum alloy armor plate.

MIL-DTL-32375 (MR)

MIL-DTL-32375 (MR), "Armor Plate, Aluminum Alloy, 7085, Unweldable Appliqué," was created for Al 7085 with two tempers, one for protection against armor-piercing projectiles and the other for blast protection. Both the manufacturer of the HEMTT A4 and the PM Heavy Tactical Trucks have specified one of the Al 7085 alloy/temper variants for the upgraded underbody kit for the HEMTT A4 and have fielded more than 400 kits.

MIL-DTL-32341 (MR)

MIL-DTL-32341 (MR), "Armor Plate, Aluminum Alloy, 2xxx, Unweldable Appliqué," was created for Al 2139 and Al 2195. These two high-performance aerospace alloys for armor applications were initially investigated in the late 1980s.

PM Stryker and General Dynamics Land Systems qualified Al 2139 for the MPK on the Stryker Family of Vehicles. More than 2,000 MPKs (over 4 million pounds) have been fielded. This high-strength, high-toughness alloy also will be used on the M2 Bradley hull.

In addition, the Long-Term Armor Strategy has qualified these alloys as a solution for tactical wheeled vehicles. Other solutions for this material are appliqué mine kits for current and future combat systems.

MIL-DTL-32262 (MR)

MIL-DTL-32262 (MR), "Armor Plate, Aluminum Alloy, Unweldable Appliqué 6061," was created for Al 6061. Al 6061 alloy has equal ballistic performance in comparison to MIL-DTL-46027 (MR) and can be substituted for Al 5083 in limited applications, such as appliqués.

PM Heavy Tactical Vehicles has been able to exploit the cost benefits and availability of Al 6061 aluminum, while maintaining current protection levels. For the HEMTT A4 alone, replacing Al 5083 with Al 6061 resulted in a 3-year cost savings exceeding $16 million. In addition, Al 6061 has replaced Al 5083 in the HMMWV Fragment Kit 5.

MIL-DTL-46027K (MR)

MIL-DTL-46027K (MR), "Armor Plate, Aluminum Alloy, Weldable 5083, 5456, and 5059," which supersedes MIL-A-46027H, was updated to include Al 5059. Like Al 6061, Al 5059 can be substituted for Al 5083 in limited applications, such as appliqués. In addition, Al 5059 is lighter than Al 5083 and has superior ballistic performance, weldability, and corrosion resistance.

BAE Systems has used Al 5059 in more than 2,000 RG-33 MRAP spall liners. The immediate cost savings incurred by replacing Al 5083 with Al 5059 for this application was over $350,000 in direct raw material costs. Also, fewer production delays occurred, allowing more vitally needed MRAPs to be delivered to the forward-deployed soldiers and marines.

Current Status

Development and implementation of five aluminum alloy specifications for military applications are complete. The new alloys have improved ballistic properties and enhanced corrosion resistance, and they increase the availability of aluminum armor for procurement and implementation on military platforms and vehicles.

A funded FY12 Foreign Comparative Testing (FCT) program was formulated during this investigation to develop specifications for other aluminum alloys that offer a high level of value to the government. This investigation will focus on new alloys Al 7017, Al 7056, and Al 2027 and complete weld qualifications to establish the appliqué Al 2195 and Al 2139 armor plates as fully weldable for repair and replacement materials for vehicles currently using Al 7039 armor plate. The newly added alloys will also offer superior weldability and improved SCC resistance.

Procurement of these new alloys will prove to be more cost-effective and meet mission scheduling requirements. Endorsements have been received from the PEO CS&CSS, the Marine Corps Corrosion Prevention and Control Office, PEO GCS, and the DoD Office of Corrosion Policy and Oversight. These endorsements indicate that they will pursue procurements of these materials for use in the systems they manage.

A new generation of conventional high-strength and high-toughness alloys—Al 7449, Al 6055 (C79), and Al 2060—will be the next series of aluminum alloys to be investigated. The Army plans to expand the HMMWV fleet to 153,000 vehicles and will also

need to purchase additional vehicles to compensate for the significant portion of the current fleet being left in Iraq. With the number of deployed HMMWVs in Iraq hovering around 25,000, requirements for other areas in South West Asia could increase the expansion to include as many as 40,000 new vehicles.

Challenges

The biggest problem associated with developing the aluminum alloys and the applicable specifications (either new or revised) was the level of standardization funding. Because standardization funding was insufficient, the team had to seek outside programs to support its efforts. However, by doing so, the team obtained sponsorships and endorsements that ultimately guaranteed the success and implementation of the specifications.

Another challenge was that many aluminum alloys are patented by industry, which can give companies that hold those patents an advantage, thus reducing the competition and increasing the cost. Therefore, the team developed chemistry requirements that were slightly outside of the patents but within the Aluminum Association's guidelines for the specific alloys. This gives everyone a fair share and allows for equal competition.

About the Award Winner

The Army team consisted of Richard Squillacioti, Kevin Doherty, Bryan Cheeseman, Brian Placzankis, and Denver Gallardy.

Richard Squillacioti led the standardization effort, which included initiating the projects to revise MIL-DTL-46027J (MR) to add Al 5059 and to create MIL-DTL-32262 (MR) for Al 6061, MIL-DTL-32341 (MR) for Al 2139 and Al 2195, and MIL-DTL-32375 (MR) for two tempers of Al 7085.

Kevin Doherty took the lead in weldability testing and provided materials expertise related to the compositions and mechanical properties of all five aluminum alloys. He was instrumental in obtaining the necessary materials to perform ballistic and mechanical testing. In addition, Dr. Doherty worked with the Army Research Laboratory's Armor Mechanics Branch to develop Al 6061.

Bryan Cheeseman was the main motivator in the development and implementation of Al 2139 and Al 2195 and the development of MIL-DTL-32341 (MR). Dr. Cheeseman was instrumental in characterizing these alloys for various applications, such as appliqué armor solutions, in the thickness range of 1 inch to 4 inches, for armor-piercing, fragmentation, and mine blast threats. In addition, he developed the acceptance data (ballistics and mechanical) for use in the specification.

Brian Placzankis was the main motivator in the development and implementation of Al 5059 and its subsequent inclusion in MIL-DTL-46027K (MR). He received funding from an FCT proposal approved by the Office of the Secretary of Defense and received sponsorship support and endorsement from PEO GCS to investigate the use of Al 5059.

Denver Gallardy took the lead with respect to establishing the ballistic acceptance criteria for all of the alloys. In addition, he developed ballistic performance data and calculated ballistic acceptance requirements for both types of tempers for Al 7085, evaluated the ballistic performance of Al 2195, and calculated ballistic acceptance requirements for Al 2195 and Al 2139.

All five team members participated in the working group meetings that took place to review and evaluate the comments received during the coordination of the specifications.

Advanced Tank Coatings Reduce Costs and Enhance Fleet Readiness

Award Winner: Navy Team





A Navy team, under the sponsorship of the Naval Sea Systems Command (NAVSEA), undertook the first Engineering for Reduced Maintenance (ERM-1) project to develop standardized advanced tank coatings that are of higher quality and reliability than the legacy coatings, which had to be applied in three layers every 5 to 7 years. The high-solids, edge-retentive, rapid-cure paints developed by the ERM-1 team can be applied in a single coat and are expected to have a service life of about 20 years. The team also developed uniform application practices, for example, the levels of surface cleanliness and roughness needed to ensure effective adhesion of the paint. The ERM-1 team completed 820 demonstration installations of the standardized single-coat paints. The installations occurred on at least one tank on every ship class. By using the new tank coatings and uniform installation practices, the Navy will avoid up-front costs of about $14.8 million per year, and by not having to repaint most of the tanks for up to 20 years, the Navy will avoid another $244 million per year and enhance fleet readiness.

Background

For decades, corrosion repair and preservation of tanks and voids in U.S. Navy ships represented the single, largest source of maintenance costs, estimated in 1996 to be about $244 million per year—or about 10 percent of the total annual cost related to shipboard corrosion. The costs included the cost of coatings and the labor cost of applying the coatings. The Navy painted the tanks and voids with solvent-based epoxy coatings, applied with varying levels of process control. Because the coatings tended to fail initially at the "edges" within the tanks, the Navy typically applied three full coats. Installation of the three-coat system on ballast, fuel, and compensated-fuel tanks required more than 200 hours. In some cases, the Navy also applied two "stripe" coats in an attempt to prevent failure at coating edges. The five-coat system was effective, but was extremely expensive to install. Adding to the costs was the short service life of the solvent-based coatings. Therefore, the Navy had to reinstall coatings when ships came in for dry-dock maintenance, historically, every 5 to 7 years.

To reduce its maintenance costs, the Navy embarked on efforts to extend ship dry-dock cycles for certain shipboard items such as tanks. To satisfy these emerging maintenance schedules, the Navy determined that a tank coating with a 20-year service life was required. To achieve such extended tank coating service life, the Navy realized that coatings must offer high chemical resistance to in-service coating degradation, high film build to provide an effective barrier coating, and some means of mitigating the observed premature failure of coatings at edges and welds.

About the same time, commercial industry began developing state-of-the-art coating systems for providing longer tank service life. These new coatings were based on ultra-high-solids (UHS) epoxy resins and contained no added solvent. In addition, the coat-

ings contained thixotropes to counter the tendency of coatings to thin or pull away from edges as the coating cures.

Problem/Opportunity

The convergence of the Navy's identification of tank coatings as its highest-cost-maintenance driver, the Navy's requirement to extend tank maintenance schedules, and industry's development of new state-of-the art coatings provided the Navy an opportunity to address several problems concurrently. To take advantage of that opportunity, NAVSEA undertook the ERM-1 project. The goal of this advanced tank coatings project was to develop high-solids, edge-retentive paint systems that could be applied as standardized materials, using universal application processes, to all ballast tanks, fuel tanks, and voids, on all Navy ship classes, including submarines, aircraft carriers, and surface ships. In addition, to appreciably reduce the fleet maintenance cost burden associated with repainting shipboard tanks—and to support extended docking cycles—the coating system would need to last three to four times longer than the legacy coating systems.

Approach

The ERM-1 team used a collaborative approach, with the fleet, Naval Research Laboratory (NRL), and NAVSEA headquarters working together to develop standardized materials and installation best practices for implementing single-coat paint on all Navy ship, aircraft carrier, and submarine tanks and voids.

The ERM-1 team began developing the UHS edge-retentive paints in 1996. The Navy defined the term "ultra-high-solids" tank coatings as having less than 150 grams of volatile organic compounds per liter of coating. In addition to these low-solvent levels, the UHS coatings were formulated to satisfy all environmental regulations for hazardous air pollutants and hazardous heavy metals.

Laboratory testing and commercial demonstrations indicated that the UHS systems offered a significant increase in service life. However, installation costs were still an issue because the UHS coatings required specialized, high-pressure spray equipment and improved quality control practices to extend coating service life. Therefore, the Navy investigated increasing the speed of the UHS coating application process by developing a paint that could be applied in a single coat and that would cure in less than one 8-hour shift. The first single-coat system using rapid-cure, single-coat paint was installed in 2003. Data collected by the NRL showed that it could be applied to an amphibious ship ballast tank in 35 hours.

To carry out this project, the ERM-1 team adopted a three-prong approach:

- Update the material specifications to standardize the paint performance requirements.

- Standardize the coating application documents.
- Demonstrate postulated successes on in-service Navy ships to verify that the high-quality coating application processes could be achieved in a real-world waterfront environment.

The team briefed the status of all three of these actions to the senior fleet staff during quarterly ERM-1 meetings.

MATERIAL SPECIFICATIONS

The ERM-1 team worked to improve MIL-PRF-23236, "Coating Systems for Ship Structures," by including laboratory tests needed to ensure the long-term performance of the UHS, edge-retentive, rapid-cure, single-coat paints. For example, the team added standardized qualification and performance verification procedures, such as edge-retention verification, cathodic disbondment, and long-term immersion. NRL personnel developed a test that uses simple extruded aluminum angles, available at any hardware store, to validate edge retention. In addition, they incorporated cathodic disbondment tests used to verify the performance of pipeline coatings into the specification.

The updated specification, MIL-PRF-23236D, published in September 2009, formed the baseline Navy performance requirements delivered to industry. NRL and NAVSEA personnel worked with industry to test and qualify products to the requirements. In many cases, vendors had to adjust product formulations to satisfy Navy MIL-PRF-23236D requirements. As a result of those efforts, the Navy now has three fully qualified, single-coat paints listed on the associated qualified products list to assist the fleet with further reducing implementation costs by allowing competition among paint vendors to supply the highest-quality single-coat paints at the lowest costs.

COATING APPLICATION DOCUMENTS

The ERM-1 team worked to improve the NAVSEA Standard Item 009-32, "Cleaning and Painting Requirements; Accomplish," which was selected by NAVSEA to serve as the Navy's standard or "universal" paint requirements document. The processes in this document replaced historical processes in which submarines were painted in accordance with the *Submarine Maintenance Manual* and aircraft carriers were coated in accordance with the *Naval Ships' Technical Manual*, Chapter 631, "Preservation of Ships in Service."

The ERM-1 team worked through the public process, which included quarterly briefings to the fleet and an annual public meeting with contractors, paint companies, and government representatives, to define the details to be included in the update to Standard Item 009-32, such as standardized levels of surface cleanliness and roughness needed to ensure effective adhesion of the single-coat paint to the tank substrate. That update, pub-

lished in March 2009, enables the fleet to reduce costs significantly by requiring all workers to follow the same coating application processes, regardless of platform, for all ballast tanks, voids, and chain lockers, using the same single-coat materials. It also enhances fleet reliability and readiness.

DEMONSTRATIONS

Over the course of the project, the ERM-1 team completed 820 demonstration installations of the standardized single-coat paints. The installations occurred on at least one tank on every ship class. Through the demonstrations, the team showed that the standardized materials and practices were delivering on the projected cost savings and on the projected service life. Below are two examples:

- Demonstrations of tank coating installations on the USS *Carter Hall* (LSD-50) showed that a single-coat paint system could be applied in 35 hours, while a conventional three-coat system required 216 hours to apply.
- Demonstrations of the use of the single-coat paint on ballistic missile submarines showed that the amount of time required for the coating process at a Trident Refit Facility could be reduced by 4 days because of the paint's rapid cure rate, which enabled workers to reenter the tanks sooner than was possible with the legacy three-coat system.

NRL personnel monitored the demonstrations and documented the performance results.

Outcome

About 49 percent of the 9,900 tanks on Navy ships and submarines have these high-performance coatings. The success of the standardized UHS single-coat systems and the improved installation practices was well documented. Not only do the new paints and application processes reduce costs substantially, but they enhance reliability and readiness because of their extended service life.

The expected cost benefit, as documented by an NRL analysis, is a 30 to 35 percent avoidance of costs associated with recoating tanks. Such savings are already being realized, with the Navy reducing the budget for submarine tank coating work by 30 percent for single-coat paint installation. Single-coat paint provides the benefits of high solids and rapid installation.

The benefits were further documented in a NAVSEA business case, which calculated the cost of applying coating on a notional 5,000-square-foot tank and estimated the costs of shipyard time, materials, and labor on the basis of actual practices. Table 1 summarizes

the results. As the table shows, even though the cost of the single-coat paint is significantly higher than that of the legacy solvent-based paint, the costs of labor and of facilities and utilities (for example, the costs of keeping a tank open, lit, and ventilated) are significantly lower, resulting in a significantly lower overall cost.

TABLE 1. Cost Comparison of Legacy and New Coating Systems

Cost element	Legacy three-coat system	Single-coat system
Paint material cost	$1,296	$6,292
Labor and quality assurance	16,732	6,658
Facilities and utilities	13,100	7,300
Total	$31,128	$20,250

NAVSEA estimates that, to date, the Navy has achieved fleetwide cost avoidance of $14.8 million per year through the use of single-coat paints. The rapid adoption of these paints by commercial yards supports the NAVSEA business case that single-coat paints save money during installation. These data are confirmed by commercial and new-construction applications in which costs of up to $246,000 per ship have been reduced on some ship classes. In addition to the up-front cost avoidance, when the single-coat paints are fully implemented, the fleet will avoid $244 million per year in costs by not having to repaint these tanks for up to 20 years.

Current Status

NAVSEA has been tracking the performance of the UHS single-coat systems that have been installed since 1996. To date, these coatings are on track to deliver the 20-year service life predicted by NAVSEA, and the Navy has already avoided having to repaint 1,864 ballast tanks. Cumulatively, use of the UHS coatings has enabled the fleet to avoid $491 million since the first demonstration installation in 1996.

The team continues to track performance on the demonstration installations. With the exception of a specific, small, problematic tank on attack submarines, some 95 percent of the 820 single-coat installations are still in service and performing effectively. In contrast, less than 50 percent of the older, legacy coating systems of similar age are still performing effectively.

The ERM-1 team also is continuing work to develop single-coat paints for use in specialized service, like potable water tanks. In the past year, two of the candidate materials failed laboratory testing by cracking.

Challenges

Overcoming technical challenges has been a major success of the ERM-1 team. One technical performance challenge was associated with the developmental nature of single-coat paints. Specifically, the team pushed paint manufacturers to speed the cure of their high-solids paints to reduce installation costs. The requirement for a long service life and rapid installation is unique to the U.S. Navy, because its dry-dock cycles are four to five times longer than the dry-dock cycles of industry. Extensive laboratory testing was required to develop the single-coat paints. Many early formulations delaminated, cracked, or blistered.

Another challenge was changing the behavior of paint application workers to ensure coating application quality. Even the best paint, if installed over a rusty or dirty surface, will fail prematurely. The ERM-1 team had to work with shipyard and contractor personnel to develop realistic, implementable approaches to ensuring coating quality. Workers had to learn to keep the abrasive-blasted surfaces in tanks free of salt contamination, adapt to a paint that cured so quickly it would not level, and learn to measure coating thicknesses an order of magnitude higher than had been measured in the past. The ERM-1 team, through NAVSEA Standard Item 009-32, developed these effective, reasonable quality assurance practices to ensure quality without increasing job costs. Paint contractors invariably commented about the learning curve required when they first installed single-coat paint and noted that their best painters, or "A Team," had to do the work. However, once the standardized processes became routine, the process expanded to all painters in the yard, and the Navy achieved the projected cost savings. One contractor mentioned that once over the learning curve, painters "love single-coat to death" because it is helping them take time out of the process, save money, and move associated production work along more rapidly. The Navy is continuing to work cooperatively with construction shipyards that have not yet adopted single-coat paint because they think the standardized application procedures are "too hard" or "too complicated."

The third major challenge was tracking, managing, and documenting reductions in costs. Collecting cost data from waterfront painting activities is always problematic. To assist with this process, the ERM-1 team worked with naval shipyards to track and document the time and money required to apply single-coat paints. The shipyards had some initial start-up costs. For example, they had to buy high-pressure pumps with spray guns that automatically mix paint as it is dispensed (as opposed to painters mixing the paint in a bucket) and to train workers and quality control personnel on the acceptance criteria for single-coat paint jobs. In addition, workers had to learn new techniques to spray the high-solids paints. All of these costs were tracked and documented to allow development of the business case that could be, and still is, being presented to contractors and shipbuilders to motivate them to use the single-coat paints. For example, shipyard data

showed cost savings from single-coat paints of $433,000 per carrier availability and $120,000 per submarine availability. These data flowed into the overall business case and motivated widespread adoption of the process. However, the cost data are not universally accepted, so the ERM-1 team is still working with Navy management to convince shipbuilders that the cost risks associated with having to rework single-coat paint in new construction are not as high as the savings that will be derived from the use of single-coat paints.

About the Award Winner

The Navy team consisted of Vernon Parrish, Mark Browder, Mark Ingle, Bill Needham, and James Martin.

Vernon Parrish had overall program management responsibility for the project, which included developing, testing, and implementing the rapid-cure single-coat system, as well as obtaining and managing project funding. In addition, Mr. Parrish provided direction and guidance to the project personnel and monitored the project's engineering and budgetary progress through periodic reviews with project personnel.

Mark Browder managed efforts to eliminate cumbersome work practices. In particular, he coordinated the implementation of the single-coat system and the NAVSEA Standard Item 009-32 update. Mr. Browder also managed technical authority funding for the implementation of the single-coat system.

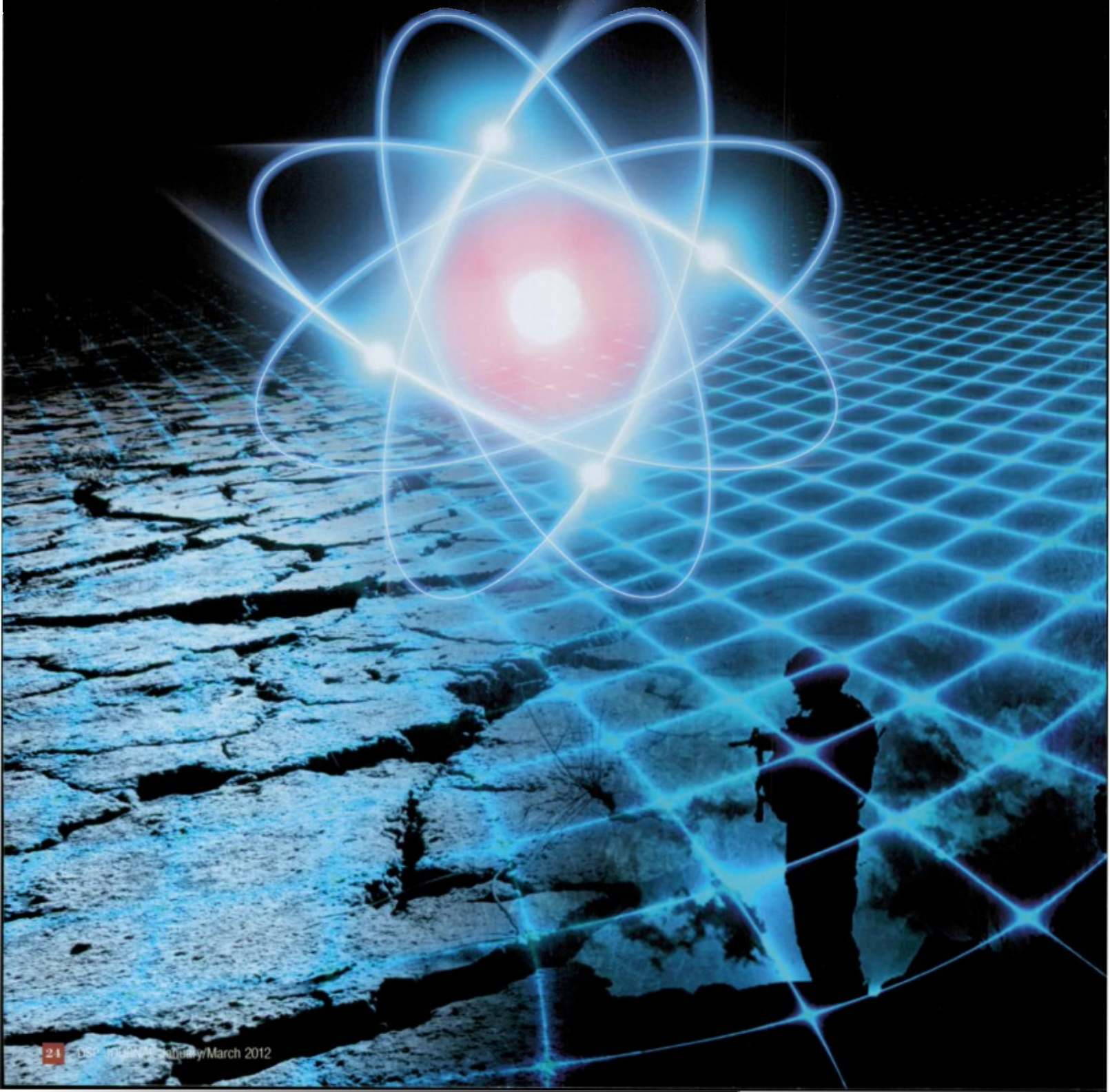
Mark Ingle provided the technical authority and strategy for standardizing across the entire Navy fleet and led laboratory efforts in support of the ERM-1 project. Among his responsibilities was updating MIL-PRF-23236D. In addition, Mr. Ingle chaired the combined fleet/industry panel that updated NAVSEA Standard Item 009-32.

Bill Needham, a department head assigned to the project, attended demonstrations at various naval shipyards where the single-coat system was being applied, documented the application process, and wrote reports on issues encountered and lessons learned. In addition, Mr. Needham evaluated the condition of the single-coat system in various types of tanks after 1 year of service to validate implementation of the system for use fleetwide.

James Martin, a senior NRL scientist assigned to the project, conducted numerous product qualification tests and participated in a number of demonstrations at commercial and naval shipyards where the single-coat system was being applied. He documented the application process, wrote reports on issues encountered and lessons learned, and performed visual evaluations of the condition of the single-coat system.

Improved EMF Standards Increase Personnel Safety

Award Winner: Jon Klauenberg



Dr. Jon Klauenberg, from the Air Force Research Laboratory, Human Effectiveness Directorate, has, for more than 20 years, provided leadership in the standardization of safety and occupational health (SOH) practices related to electromagnetic fields (EMF). Most recently, he led the revision of DoD Instruction (DoDI) 6055.11, "Protecting Personnel from Electromagnetic Fields," which referenced, for the first time, standards developed by a civil standards developing organization (SDO), the Institute of Electrical and Electronics Engineers (IEEE). In addition, he engineered the transition to IEEE of responsibility for updating and managing a NATO standardization agreement (STANAG) on the protection of personnel from the hazards of electromagnetic (EM) energy. Dr. Klauenberg also obtained a waiver of overly restrictive EMF safety standards, proposed by the European Commission (EC) on Worker Safety, that would have prevented the deployment of certain military systems, which, in turn, would have put NATO and U.S. armed forces at risk. Finally, he obtained no-cost public access to IEEE EMF safety standards. Dr. Klauenberg's work has ensured continued safe operations, minimized mission impacts, fostered interoperability globally, and avoided significant costs related to EMF safety standards.

Background

Standards for protecting personnel from hazards due to overexposure to chemical, biological, or physical agents are key elements of military force protection. SOH standards enable safe fielding of new technologies and are essential to interoperability. In particular, standardization of SOH practices related to exposures to electric, magnetic, and electromagnetic energies has been a significant issue nationally and internationally. In addition, recent efforts by some organizations to reduce exposure limits in response to societal/public concerns have led to limits that would degrade or defeat many military systems. This force health protection issue has been recognized at the operational levels at both DoD and NATO as a problematic trend that threatens continued deployment and expansion of the electronic battle space.

Standardization of personnel exposure limits to EM energy within DoD has been a tri-services effort for over 50 years. The services combine research, medical, operational, and standardization expertise at the Transmitted Electromagnetic Radiation Protection (TERP) Working Group (WG), which reports to the Deputy Under Secretary of Defense for Installations and Environment through the DoD SOH Committee. Although some standards define individual characteristics of single parts, the EM SOH standards span the entire EM spectrum. Essentially, within the overarching safety standard are multiple standards limits differentiated by characteristics of frequency, emitted and absorbed power, pulse shape, and duration of personnel exposure. Each of the exposure limits must be continually reassessed and revised as new bioeffects data become available and as science and technology advance. Revisions to

standards are major actions taking several years to evaluate hundreds of new peer-reviewed scientific articles.

Problem/Opportunity

One of the TERP WG's products is DoDI 6055.11. When developing the 2009 edition of the instruction, the TERP WG, at that time chaired by Dr. Klauenberg, recognized that the increased complexity of bioeffects data required the participation of subject matter experts (SMEs) beyond DoD. Therefore, it looked to the IEEE International Committee on Electromagnetic Safety (ICES). IEEE/ICES is an international SDO with more than 125 participants—from government agencies, universities, industry, and the public and from 14 disciplines, including medicine, epidemiology, biology, biophysics, physics, electrical engineering, and risk management—from 25 countries. IEEE/ICES leverages international resources, bringing the world's leading EM research, technical, and standardization experts into the development process. The IEEE C95 series standards, which contain recommendations to prevent harmful effects in human beings exposed to electromagnetic fields in the frequency range from 0 kHz to 300 GHz, have been approved by the American National Standards Institute, which accredits SDOs that follow the principles of balance, openness, due process, and consensus among a diverse range of stakeholders. Dr. Klauenberg believed that such multinational involvement was critical to acceptance and harmonization with allied nations. Ultimately, the 2009 edition of DoDI 6055.11 adopted, by reference, the IEEE C95 series of nongovernment standards.

DoD's adoption of the IEEE C95 standards for DoDI 6055.11 set the stage for Dr. Klauenberg to take several far-reaching steps in international standardization through the NATO Standardization Agency (NSA). Specifically, he was instrumental in obtaining a waiver of overly restrictive EMF safety standards; shepherding the first-ever transition of a NATO standard—STANAG 2345, "Evaluation and Control of Personnel Exposure to Radio Frequency Fields–3 kHz to 300 GHz"—to IEEE/ICES; obtaining no-cost public access to IEEE EMF safety standards; and organizing and leading NATO Research Task Group (RTG) 189, Bio-Effects and Standardization of Exposure Limits of Military Relevant High Energetic Electromagnetic Pulses, a forum for coordinating international research related to development of EMF safety standards.

Approach

NATO STANAGs are supposed to be reviewed every 3 years and revised, reaffirmed, or canceled. Usually the revision/update is a relatively uncomplicated endeavor bringing SMEs together for no more than four drafting meetings. STANAG 2345 was scheduled to be updated by 2006. However, the review of STANAG 2345 was delayed due to the publication, by the EC on Worker Safety, of EC Directive 2004/40/EC, "Proposed Directive of the European Parliament and of the Council on the minimum health and

safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (XXth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)." That directive was slated to become European Union (EU) law in April 2008.

EU member nations of the NATO Electromagnetic Environmental Effects Radiation Hazards Working Group noted that their militaries would be required to follow the new directive instead of NATO STANAG 2345. Non-EU NATO members indicated that they would not adopt the proposed directive due to several operational impacts of the overly restrictive limits. Other stakeholders, such as NATO operational experts, SOH standards setters, industry, and the medical community (with regard to magnetic resonance imaging), also expressed concern that several exposure limit values proposed in the directive were unnecessarily restrictive and would have a negative effect on operations and interoperability, curtail use of valued medical procedures, and potentially create other safety risks. In response to stakeholders' concerns, the deadline for transposing the directive into EU legislation was delayed from April 2008 to April 2012.

The 4-year delay in transposing the EC directive opened a window of opportunity for NATO to gain access to the EC advisory group on EMF Worker Safety as a stakeholder in the ongoing review.

The 4-year delay in transposing the EC directive opened a window of opportunity for NATO to gain access to the EC advisory group on EMF Worker Safety as a stakeholder in the ongoing review. Dr. Klauenberg was designated as the SME to serve as the NATO stakeholder representative to the EC special advisory group. He participated in numerous meetings of the advisory group, briefing the EC on the effects on military operations of several exposure limits proposed in the directive and demonstrating that unnecessarily restrictive limits will increase risk to personnel due to degradation or shutdown of certain military equipment and systems. For example, one proposed reduction in allowed limits would put the entire deck of a frigate off limits. Dr. Klauenberg organized a meeting between the NSA deputy director and an EC director to explain the problem and the proposed solutions. Ultimately, the EC director agreed to include a waiver, for NATO and DoD, stating that the directive would not apply to the armed forces in EU countries in which "an equivalent and more specific protection system," such as NATO STANAG

2345, is already in place and implemented. The waiver, which is part of the EC-adopted revision of the directive, awaiting European Union parliamentary vote, removed the obstacle to the revision of NATO STANAG 2345 and will facilitate ratification and continued interoperability.

Subsequently, STANAG 2345 was selected for transition to a civil SDO. Achieving that required first obtaining approval for the transfer from the NSA Military Medical Standardization Working Group, which had responsibility for the STANAG. After being briefed on the planned process for the transfer (now part of Allied Administrative Publication 3-J, "Production, Maintenance and Management of NATO Standardization Documents") and discussing concerns about the loss of NATO control, the working group was assured that final approval for adoption of the civil standards would be with NATO and that Dr. Klauenberg, the STANAG 2345 custodian, as well as any interested NATO EM SME, could participate in the standard's development.

IEEE was the only SDO legally able to set voluntary, consensus-based EM exposure standards that met NATO requirements. An added benefit of working with IEEE was that members of ICES had participated in drafting previous editions of STANAG 2345 as well as in NATO advanced research workshops on radio frequency safety standards organized and directed by Dr. Klauenberg. He worked with the NATO Civil Standards Coordinator to engineer a technical cooperation agreement between NATO and IEEE for all IEEE standards, which was signed on May 14, 2009. This was followed by a specific agreement between NATO and IEEE for IEEE/ICES to assume responsibility for and ownership of the development of a military workplace-specific SOH standard limiting personnel exposure to electromagnetic fields. The standard will be covered by NATO STANAG 2345.

Adopting civil standards comes with a price. Unlike the freely available DoD standards, civil standards must be purchased. This was problematic for NATO nations that would now be required to buy multiple IEEE-NATO C95 standards. STANAG 2345 was one of the first STANAGs to be placed on the NATO public access site, but that would end with the publication of the new copyrighted IEEE-NATO standard, which would carry the standard IEEE prices. European developers and users of EM exposure standards indicated that they would not consider using the costly IEEE standards. Leaders of the TERP WG negotiated for, and the services funded sponsorship of, the first-ever release of the IEEE C95 standards on the IEEE "Get Program" public website (http://standards.ieee.org/about/get/).

Finally, Dr. Klauenberg, through the multinational RTG 189, advanced the insertion of cutting-edge research into safety standards. With his leadership and expertise, the RTG

concluded that peak electric field limitations were ultraconservative and unnecessarily limiting deployment of high peak power counter-electronic systems and directed-energy systems. On the basis of RTG 189 consensus, restrictions are being removed from IEEE, NATO, and DoD safety standards, enabling deployment of several military-unique systems in development.

Outcome

Dr. Klauenberg's work significantly enhanced international interoperability and safety, both for individuals exposed to EMF and for the armed forces as a whole, due to the ability to field systems that would not have been possible without the waiver of Directive 2004/40/EC. In addition, the waiver saved DoD and our coalition partners millions of dollars that would have been spent buying land, moving fences, reestablishing safety distances for ranges and communications equipment, revising manuals and training, and so on.

Dr. Klauenberg's work to make EM standards freely available also resulted in significant cost avoidance. It will save DoD alone more than $1.5 million over 5 years (May 2011–May 2016), and worldwide it will save military, industry, commercial, and public users an estimated $4.5 million. Furthermore, the potential for unlimited access facilitates greater international and NATO use, fostering harmonization toward a global standard and enhancing interoperability.

Transitioning responsibility for developing and maintaining the standards to an SDO also decreased DoD's investment of time and dollars in developing standards. In addition, Dr. Klauenberg's efforts at the IEEE have greatly expanded DoD's influence in maintaining DoD-compatible safe exposure limits. His diligence and diplomacy has paid off repeatedly with edition after edition of EMF safety standards that are compatible with operational requirements. Furthermore, the transition of EMF standards to an SDO conforms to the Office of Management and Budget Circular A-119 revised guideline for federal agency implementation of the National Technology Transfer and Advancement Act of 1995 (Public Law 104-113). The act directs all federal government agencies to use, wherever feasible, standards and conformity assessment solutions developed or adopted by voluntary consensus standards bodies in lieu of developing government-unique standards or regulations. NATO has similar requirements.

Current Status

The revised EC directive on EMF worker safety has a waiver for the military and calls out STANAG 2345 as an example. The contract with IEEE for no-cost access has been signed, the website is now active, and the response from U.S. Air Force, DoD, national, and international users has been highly positive.

The IEEE-ICES editorial committee has rapidly engaged on military issues in revising EMF standards.

The IEEE-NATO military workplace standard draft has been completed and is ready for submission to the NATO Military Medical Standards working group. Transfer to IEEE removed time and dollar cost to NATO and DoD. ICES volunteers invested over 1,000 hours for multiple meetings, literature reviews, and editing.

Going civil in an international standardization environment requires agreements to be drawn, competing regulations and standards to be addressed, costs to be managed, and accessibility to be assured. Entrusting the development of EM safety standards to IEEE, one of the leading standards-making organizations in the world, leverages the expertise of the standards setters, maintains currency, reduces costs, and ensures force readiness and force protection. These actions will ensure safe operations guidance that minimizes operational impacts, advances international harmonization, and facilitates ratification of NATO STANAG 2345 under revision by the IEEE.

Challenges

The transition to civil standards was uncharted. NATO, DoD, and other U.S. government agencies implemented policies to use civil standards whenever possible but did not a define a process for making the transition. (NATO Allied Administrative Publication 3-J now does.) The complexity of EMF safety standards required a focused approach that could be gained only through a dedicated nongovernmental standardization activity, but how to accomplish this with respect to military-unique environments was a problem.

The shift to civil standards created a cost burden on the users, who are typically lower echelon operators and technicians. The high cost of obtaining multiple IEEE safety standards, which change every 3 to 5 years, has affected the use of both those standards and any standards that reference them. A low-cost solution was needed. Dr. Klauenberg, recognizing the cost problem while leading the revision of DoDI 6055.11, met with IEEE Standards Association leaders to request free access. Negotiations continued for 3 years, with the price being reduced to an affordable level for tri-service sponsorship. International access to IEEE standards has been good public relations for DoD, and it increases use of the DoD-selected standards, thereby increasing interoperability.

Access to international activities is difficult but necessary to ensure that U.S. and NATO interests are served. The NSA Civil Standards Coordination Office and the NSA director provided much needed access.

Funding of travel to participate in high-level international standardization activities has always been a problem and threatens continued U.S. DoD influence. Electronic communications have provided a limited resource for continued involvement.

About the Award Winner

Dr. Jon Klauenberg is a member of the Air Force Research Laboratory's Radio Frequency Bioeffects Branch, 711th Human Performance Wing. He served as the custodian of STANAG 2345 for 18 years, directed several NATO advanced research workshops, chaired NATO Research Technology Organization task groups on EM energy bioeffects and standards, and is a member and previous chair of the DoD TERP WG. In addition, Dr. Klauenberg has been a member of IEEE/ICES for more than 20 years, is currently on the editorial committee, and was the recipient of the 2011 IEEE Standards Association International Award. His vast breadth of experience and varied skill sets established him as a preeminent expert in the EMF standardization discipline and provided DoD access to high-level international and national EMF standardization activities. His knowledge of DoD, national, and international standards allowed him to network with NATO, IEEE, and our coalition partners to ensure establishment and maintenance of technically sound and scientifically supportable safety standards for all EMF applications.

Alternative Sustainable Plating for Electrical Connectors Reduces Exposure to Hazardous Material

Award Winner: Lisa Hoffer

Lisa Hoffer, the lead engineer for the Circular Connector Group, part of the Interconnection Branch at Defense Logistics Agency (DLA) Land and Maritime, has contributed significantly to the DoD Standardization Program in support of its efforts to minimize the use of hazardous materials. Specifically, she led a significant standardization effort to develop alternative materials for plating electrical connectors that meet the same stringent corrosion resistance, system compatibility, durability, and electrical performance requirements as the widely used, but hazardous, cadmium finish. This effort culminated in the identification of three alternatives, which were added to seven basic connector specifications and more than 60 military connector specification sheets. The seven specifications cover hundreds of standardized connectors for use by the military. These standardized parts are expected to facilitate lower procurement costs, shorter procurement lead-times, increased operational readiness, and a reduced logistics footprint. The standardized products will also facilitate competition among connector manufacturers. In addition, standard parts can be used across multiple platforms to advance the goal of interoperability among the military services.

Background

Cadmium is currently the most widely used finish for coating metals susceptible to corrosion. Although cadmium finishes have proven to be very durable in the harsh environments commonly encountered by our warfighters, exposure to cadmium is considered a health risk. Therefore, it has become the goal of many governments and industry to reduce and ultimately eliminate cadmium from manufactured products and systems.

Problem/Opportunity

Weapon system programs, for example, the Joint Strike Fighter and the *Zumwalt*-class destroyer programs, have expressed interest in electrical connectors with alternative plating options. To meet their requirements, DLA Land and Maritime—which is the specification preparing activity for numerous electrical connector military specifications and has inventory control and procurement responsibilities for electrical connectors—undertook the task of identifying and standardizing cadmium-free alternatives in support of hazardous material minimization.

Approach

The DLA Land and Maritime's Circular Connector Group partnered with SAE International's AE-8C1 Connectors committee, a non-government standards developing organization, to identify alternative finish options capable of meeting the same stringent electrical performance, environmental, and mechanical requirements as cadmium plating. AE-8C1, which consists primarily of weapon system original equipment manufacturers (OEMs) and leading manufacturers of military-qualified

connectors, is dedicated to creating, preparing, and maintaining all relevant specifications, standards, and requirements for connectors.

The DLA-SAE team, led by Ms. Hoffer, evaluated many finishes. Corrosion testing of electrical connectors included 500 hours of dynamic salt spray testing. This corrosion test is done in a salt spray chamber and requires 500 durability cycles (connector mating and unmating). Fifty durability cycles are performed prior to salt spray, which preconditions the connectors, while the remaining durability cycles are performed after salt spray, which is intended to help evaluate the lubricity of the finish, as well as the resistance to galling for connectors with threaded mating systems. In addition, connectors must continue to meet all electrical test requirements following salt spray exposure. Any alternative finish must have the same electrical bonding (shell-to-shell conductivity) capability as cadmium, which is necessary for weapon system applications susceptible to electromagnetic interference. Finally, alternative finishes must perform to the same temperature range (−65 to +175 degrees Celsius) as cadmium finishes.

Of the many finishes evaluated, only three—nickel fluorocarbon polymer, zinc nickel, and pure electrodeposited aluminum—were identified as being suitable plating/finishing options for replacing cadmium. DLA Land and Maritime added these options to five circular connector specifications:

- MIL-DTL-22992, "Connectors, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type"
- MIL-DTL-26482, "Connectors, Electrical (Circular, Miniature, Quick Disconnect, Environment Resisting), Receptacles and Plugs"
- MIL-DTL-28840, "Connectors, Electrical, Circular, Threaded, High Density, High Shock, Shipboard, Class D"
- MIL-DTL-38999, "Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts"
- MIL-DTL-83723, "Connectors, Electrical (Circular, Environment Resisting), Receptacles and Plugs."

DLA Land and Maritime also added the alternative plating materials to two rectangular connector specifications:

- MIL-DTL-24308, "Connectors, Electric, Rectangular, Non-Environmental, Miniature, Polarized Shell, Rack and Panel"
- MIL-DTL-83513, "Connectors, Electrical, Rectangular, Microminiature, Polarized Shell."

MIL-DTL-38999 and MIL-DTL-83513 are among the most important military specifications for controlling circular and rectangular connectors used in weapon system interconnect applications.

The team also added the three plating options to more than 60 associated military specification sheets. At the same time, SAE revised its Aerospace Standard AS85049, "Connector Accessories, Electrical, Backshell, Shield Band, Category 7," a specification for accessories designed for and intended for use with military circular connectors.

Since the addition of the new finishes to the military specifications, several connector manufacturers have taken action to seek qualification of their products with new plating options, and three have been added to the appropriate qualified products list (QPL):

- Amphenol Aerospace connectors with nickel fluorocarbon polymer finishes and zinc nickel finishes have been added to QPL-38999.
- Souriau connectors with nickel fluorocarbon polymer finishes and zinc nickel finishes have been added to QPL-38999, and its connectors with zinc nickel plating have been added to QPL-26482.
- Glenair connectors with pure electrodeposited aluminum have been added to QPL-83513.

Outcome

The three new connector plating materials meet the same performance requirements as cadmium plating without the potential hazards to our warfighters. These connectors will provide the military and industry with the sustainable, hazardous-material-free connectors needed for their missions.

The seven basic connector specifications to which the three new plating materials were added cover hundreds of standardized connectors for use by military customers and their OEMs. The end result will be thousands of new connectors for use in hundreds of demanding military systems. (MIL-DTL-38999, alone, is used in more than 635 weapon systems and accounts for thousands of dollars in DLA sales each year. More than 7,000 national stock numbers are associated with this specification.) These standardized parts are expected to facilitate lower procurement costs, shorter procurement lead-times, increased operational readiness, and a reduced logistics footprint. These standardized products will also facilitate competition among connector manufacturers. In addition, standard parts can be used across multiple platforms to achieve the goal of interoperability among the military services.

Ms. Hoffer's efforts precluded the costly piecemeal introduction of nonstandard parts in an effort to achieve a similar end. For example, on the basis of the DoD Parts Manage-

ment Program model, conservative estimates indicate that for one specification alone, the preclusion of a minimum of 100 nonstandard parts annually would result in a cost avoidance of over $2 million each year. An added benefit of the military specifications, which each require qualification to a QPL, will be the multiple qualified manufacturers for these connectors, which is expected to result in supply availability for years to come.

Current Status

The five circular connector specifications and two rectangular connector specifications have each been dated and approved. They are available from DLA's ASSIST. Several manufacturers are in the process of qualifying additional products to these specifications.

Some activities are ongoing, such as evaluation of the galvanic compatibility of the alternative plating materials on the connectors with the plating material of subcomponents, such as panels and black boxes in weapon systems. Ms. Hoffer is involved with continuing efforts to determine which alternative plating options present the most compatible alternative to cadmium in existing systems. She also networks with and provides assistance to other interested parties in determining which plating alternatives provide the best option for weapon systems still being developed.

The Naval Air Systems Command is conducting ongoing beachside atmospheric exposure testing at the Kennedy Space Center test site as an additional validation of the new connector alternative plating options.

Ms. Hoffer continues to be involved with hazardous material mininization issues related to cadmium plating connectors. Most recently, during the development of a new Defense Federal Acquisition Regulation Supplement clause (published in May 2011) for the minimization of hexavalent chromium (a substance used in the preparation of cadmium finishes on electrical connectors), she provided input on behalf of DLA Land and Maritime and coordinated efforts with SAE's AE-8C1 Connectors committee. She also has participated in DoD's ongoing Advanced Surface Engineering Technologies for a Sustainable Defense (ASETSDefense) initiative. ASETSDefense brings together key players from the military departments and industry to share information and technical data from research and testing of military weapon system subcomponents, including electrical connectors and fasteners.

In addition, Ms. Hoffer is an integral member of an ad hoc working group consisting of DLA Land and Maritime, SAE, U.S. Navy, U.S. Air Force, and U.S. Army document custodians, along with manufacturers and OEMs representing ship, submarine, and aircraft builders.

Challenges

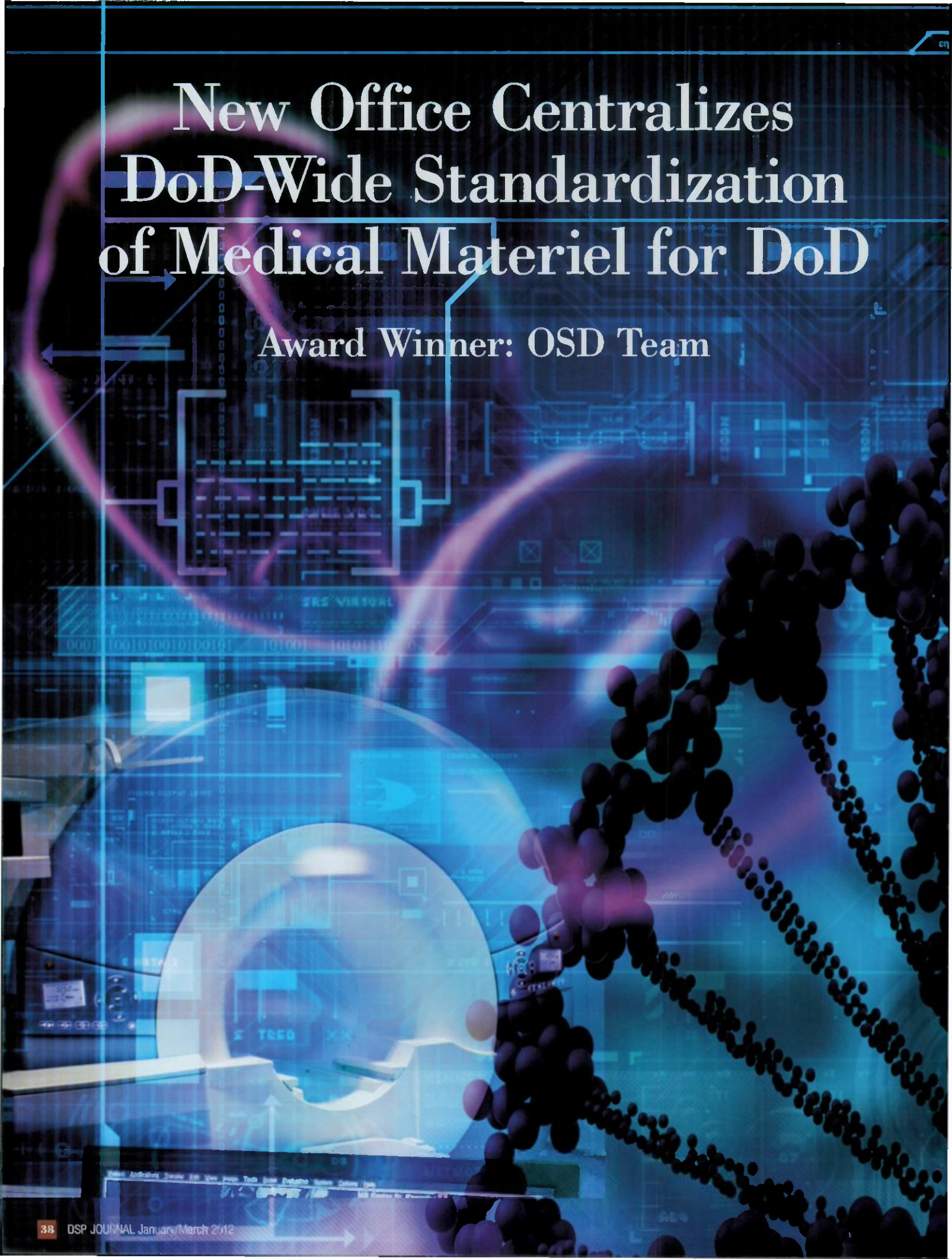
This specification standardization development process required coordination with more than 100 individuals representing several military departments, connector manufacturers, OEMs, and nongovernment standardization organizations.

About the Award Winner

Lisa Hoffer was the primary DLA Land and Maritime focal point for this effort. Her responsibilities as the preparing activity have been many, including requesting projects, generating and coordinating drafts, consolidating comments and recommending dispositions, resolving comments, obtaining final approval for documents, and answering the many questions along the way.

New Office Centralizes DoD-Wide Standardization of Medical Materiel for DoD

Award Winner: OSD Team



A team from the Office of the Secretary of Defense (OSD) Defense Medical Materiel Program Office (DMMPO) undertook an initiative—the Materiel Enterprise Standardization Offices (MMESO) initiative—to standardize Class VIII supplies (medical materiel) for use throughout DoD. The team developed a centralized, clinically driven process to standardize medical materiel through the collaborative selection of medical joint products of choice (JPOCs). The initiative supports the full spectrum of medical care—from the battlefield to Level 1 trauma centers. In the first 13 months of the program, the team, through a focused strategic communication effort, marshaled the support of 1,074 medical logisticians and clinicians from all four services in the selection of medical JPOCs. The first 14 approved standardization actions, once implemented, will save an estimated $7.4 million annually for 5 years. In addition, through standardization and reduced variability, the medical JPOCs will improve patient outcomes, improve interoperability, optimize training resources, and streamline the supply chain within DoD for Class VIII supplies.

Background

In 2008, the Military Health System's (MHS's) leadership acknowledged that the nine Tri-Service Regional Business Offices (TRBOs), the primary standardization programs for Class VIII materiel executed by the MHS, provided varying degrees of success in standardizing those supplies. Their disparate, uncoordinated efforts lacked a cohesive, enterprise-wide strategy. The lack of a strategic vision and policy hindered the services' abilities to standardize medical materiel, as well as to integrate standardized products for both institutional (fixed facility) and operational (deployed) use.

To address the lack of enterprise capability related to standardization of Class VIII supplies, the Assistant Secretary of Defense for Health Affairs, in July 2009, established DMMPO, collocating clinicians and medical logisticians within one agency with the mission responsibility to promote policy and standardization of medical supplies and equipment.

In October 2010, DMMPO undertook the MMESO initiative to improve acquisition efficiency and effectiveness for both institutional and operational forces, improve joint commonality and interoperability, promote cost-effective infrastructure, and meet common and unique service operating requirements. Specifically, DMMPO replaced the nine legacy TRBOs with five regional MMESOs (Europe, North, South, West, and Pacific) and tasked them to standardize medical materiel for the DoD enterprise.

Problem/Opportunity

Before 2010, DoD lacked a joint, enterprise-wide Class VIII standardization strategy and program. The legacy TRBO program standardized medical product lines exclusively for

a specific geographic region and only in support of generating force requirements. The MHS addressed the operational force requirements through the Operational–TRBO (OTRBO) through a separate contract.

The division of institutional and operational standardization efforts negated systemic opportunities for efficiencies in supply chain and life-cycle management of Class VIII supplies. In addition, the nine TRBOs and the OTRBO functioned independently, with no common governing body. Disparate governance and processes, along with a lack of data sharing, resulted in suboptimal achievements in Class VIII standardization, systemic duplicity of efforts, and fragmentation of standardization resources.

The creation of the DMMPO and its MMESO initiative allowed structuring of the standardization effort as a joint, clinically led, deliberate review process intended to improve quality of care by reducing variance within specific product lines. Imperatives to Class VIII standardization included patient safety, improved clinical outcomes, best practices, financial value, and interoperability.

The emphasis of the MMESO program is that all standardization actions be clinically driven and logistically supported to ensure maximum buy-in from the end users: the clinicians.

Approach

In January 2010, the DMMPO developed an implementation plan for a revolutionary enterprise standardization construct for Class VIII supplies and, in June 2010, published the first MMESO implementation guide. The detailed guide specified the goals, roles, responsibilities, and processes for all personnel involved in the program. The MMESO leaders directed that initial product lines selected as JPOCs optimize service requirements, cost avoidance, line-item reduction, and assemblage life management cycles.

The MMESO team identified seven distinct steps to establishing a JPOC:

- *Identify candidate product lines.* This step requires an analysis of procurement data, current regional incentive agreements, services' recommendations, and return on investment. The list of candidate products is sent to the MMESOs for product selection and initial market research.
- *Identify product line requirements on the basis of clinical needs.* This step requires the development of an individual project plan (IPP) that identifies the product line's technical and clinical requirements for the institutional and operational forces, available products, and evaluation method, as well as the government contract agent.
- *Develop and select an acquisition strategy.* This step requires an analysis of current and potential sources of supply to identify the best procurement method.

- *Evaluate and analyze the products.* This step is done by the clinical product team, consisting of clinical, logistic, and biomedical/technical subject matter experts. Once evaluated, product lines exceeding the clinically preferred threshold are analyzed for pricing in accordance with the previously developed acquisition strategy. The acquisition strategy determines the actual pricing agreement, for example, a contract or incentive agreement (IA), that identifies the selected vendor and the preferred product at the best price for the enterprise.
- *Finalize the results.* This step includes preparation of a decision document (DD) identifying the selected vendors. The DD is sent to the government contract agent for review, to the DoD executive-level Clinical Advisory Committee for service and agency-level approval, and then to the Force Health Protection Integration Council for final DoD approval.
- *Implement the standardization decision.* The decision is implemented through the defense medical logistic agencies and user communities by means of formal communications, information systems updates, and Joint Product Review Board meetings. Logistic agencies then procure the JPOC using purchasing agreements or contracts. The services' logistic forward operating agencies update the sets, kits, and assemblages with the newly standardized JPOC. The expected timeline for implementation is 9 months from announcement of the IA.
- *Monitor compliance.* Compliance has three aspects:
  - Ensure that the products are introduced and used as agreed with the selected vendor.
  - Ensure that expected benefits from the agreement are realized. The MMESO team checks to ensure that discounted pricing and other incentives (such as equipment or value-added services) are provided.
  - Report compliance data.

  The MMESOs are responsible for monitoring and reporting compliance for their respective geographic areas to the DMMPO. The DMMPO will check information systems/data for currency and publish operational metrics. In addition, the MMESO team gathers feedback from clinical users on the performance and acceptability of the JPOCs for ongoing process improvement.

Outcome

The greatest success of the MMESO program in its inaugural year, starting in October 2010, is that it established the first viable enterprise-wide standardization program to support the selection of Class VIII JPOCs for use by all military services in both the institutional and operational forces. Establishing, executing, and socializing the MMESO program from the bottom up required the dedicated efforts of countless personnel.

The following are the key successes of the program's inaugural year:

- Established a viable MHS medical materiel standardization program involving 163 medical treatment facilities, as well as all services' operational platforms.
- Marshaled the support of 1,074 medical logisticians and clinicians from all four services in the selection of 14 product groups for standardization, with a projected annual cost savings of $7.4 million for 5 years. Table 1 identifies the 14 product groups approved for standardization and, for each, shows the current annual usage, the average discount off DoD distribution and pricing agreements, and the potential annual savings. As of January 2012, 4 of the 14 product groups have signed IAs and are at the implementation stage, and 10 are awaiting final signatures for the IAs.
- Anticipated line item reduction by up to 73 percent from current procurement rates through procurement of the MMESO JPOCs.
- Identified policy gaps in partner agency's compliance with the Trade Agreement Act. This resulted in improved regulatory controls for MHS Class VIII procurement.
- Through MMESO representation on the Army Surgeon General's medical materiel standardization decision brief team and on an integrated process team (IPT), gained a three-star general officer as champion of the MMESO standardization process.

TABLE 1. Product Groups Approved for Standardization ($ millions)

Product group	Current annual usage	Enterprise average discount	Potential annual savings
Irrigation fluids	$3.05	7.52%	$0.23
Stethoscopes	1.91	2.33%	0.04
IV gravity tubing	6.96	12.86%	0.89
Airways oral	0.11	16.61%	0.02
Blood collection vacuum tubes	2.54	3.76%	0.09
Dressings sponges	2.64	34.42%	0.91
Electrocautery supplies	9.30	1.47%	0.14
Endotracheal tubes	0.90	8.77%	0.08
Speculum vaginal disposable	1.18	16.46%	0.19
Staplers and staples internal	13.60	19.13%	2.60
IV catheters	5.26	27.86%	1.47
OR gowns disposable	1.65	18.62%	0.31
Surgical dressing tape	1.77	6.20%	0.11
IV fluids	5.94	5.27%	0.31
Total	$56.81	—	$7.39

- Anticipated training efficiencies and improved interoperability through use of JPOCs institutionally, intertheater, and interservice.
- Improved product identification of the Medical Contingency File and Corporate Exigency Contracts.
- Empowered clinicians to identify and select JPOCs.
- Increased buy-in for the program, including from many personnel who were resistant to joint standardization and feared a loss of autonomy in the selection of medical materiel.
- Presented more than 85 briefs to service, agency, and industry partners to socialize the MMESO program. In addition, the MMESO leaders instituted the publication of a quarterly newsletter, as well as articles on the Naval Medical Logistics Command website and for *Force Health Protection and Readiness*.
- Influenced the Army Surgeon General's decision to champion the MMESO JPOCs for all Army Medical Command (MEDCOM) Class VIII procurements at an 80 percent rate, which is being written into policy in the form of the first MEDCOM pamphlet on medical materiel standardization.
- Held five regional MMESO conferences and two global MMESO conferences to establish and train core MMESO personnel, key staff members from the five MMESO areas of responsibility, the services' military treatment facilities, and operational medical units, as well as to capture lessons learned and to implement continuous process improvements within the MMESO initiative.
- Successfully presented a case analysis and program review to the Deputy Assistant Secretary of Defense for Force Health Protection and Readiness to justify the value added by the MMESO program to the MHS and DoD (critical in the current fiscal environment).

Current Status

The MMESO team expects to standardize 50 product lines in FY12 and, beginning in FY13, plans to turn its attention to the standardization of complex equipment (with greater potential for cost savings).

In addition, the MMESO team continually looks for process improvement through biweekly clinical working group meetings, monthly MMESO working group meetings, and regional and global conferences.

Finally, a MMESO representative continues to serve as a member of the Army IPT for drafting and publishing the MEDCOM pamphlet governing Class VIII standardization, ensuring integration of joint and service Class VIII policies and processes.

Challenges

The MMESO faced two key challenges:

- *A lapse of 3 months between the legacy TRBO/OTRBO contract and the new MMESO contract.* The lack of continuity in contracts resulted in the loss of critical TRBO/OTRBO data, which could not be recovered. In addition, many experienced staff members were lost during this gap. This resulted in an unanticipated requirement for intense training seminars and frequent video and telephone conferences to ensure everyone understood the baseline expectations to develop the new enterprise-wide standardization process.
- *Strong clinical resistance to supporting a procurement process to which they perceived they had little or no input.* Through the establishment of a standardized, rigorous, clinically led, and evidence-based process for selecting JPOCs, clinical support increased and continues to do so. This support significantly increases procurement and acceptance of the JPOCs. The MMESO directed its strategic message at all levels, from the Joint Staff to the end users at military treatment facilities and other points of injury care.

About the Award Winner

The OSD team consisted of Laura Torres-Reyes, Robert Newell, Colleen Shull, Stephen Casimir, and Tammie Morton.

Laura Torres-Reyes (Col, U.S. Air Force) is the director of the DMMPO and oversaw the MMESO program. She led the transition of the nine TRBOs and the OTRBO to the five MMESO areas of responsibility. Through her leadership, the MMESO program achieved remarkable successes in its first year.

Robert Newell (CAPT, U.S. Navy) served as the MMESO program's designated senior logistician providing strategic and operational guidance to the MMESO program manager.

Colleen Shull (COL, U.S. Army) served as the MMESO program's designated senior clinician and change management leader. She championed the clinical relevance within the MHS's diverse clinical communities of interest and provided critical leadership in bringing the medical logistics and clinical communities together to understand the strengths, weaknesses, opportunities, and threats each community brought to the program. COL Shull was instrumental in the Army Surgeon General's decision to use the MMESO process as the template for the first MEDCOM standardization pamphlet to be published this year.

Stephen Casimir (Lt Col, U.S. Air Force) served as the MMESO contracting officer's representative and the program manager for the entire MMESO effort. He was instrumental in ensuring that the new contract, significantly different from that used in the legacy program, began positively. As a logistician, he ensured that this clinically led standardization effort secured the buy-in and support of both the clinical and logistical communities. In addition, Lt Col Casimir reviewed and approved all IPPs (the de facto road map for each standardization action) and DDs, and he is the signatory for the IAs.

Tammie Morton (LTC, U.S. Army) served as the assistant program manager for the MMESO effort. Under her leadership, the DMMPO, senior clinicians, clinical analysts, and team leads met regularly

(and continue to meet two or three times per month) to discuss and resolve clinical and logistical issues. She cochaired monthly enterprise-wide MMESO teleconferences and was the officer in charge of the annual MMESO workshop to address real-time issues within the enterprise. Also, LTC Morton reviews all the IPPs before posting them on the Federal Business Opportunities website.

Also integral to the success of the MMESO program were John Ware (CDR, U.S. Navy) who served as the assistant contracting officer's representative and, as a clinician, was instrumental in providing the clinical foundation for the MMESO effort; General Dynamics Information Technology; Object CTalk, Inc.; Digital Foundation Corporation; the regional MMESO-designated (and assistant) senior clinicians and logisticians; Defense Logistics Agency Troop Support; and the 1,074 medical clinicians and logisticians representing all services.

Program News

Topical Information on Standardization Programs

DSP Recognizes Achievements in Standardization

Annually, the DSP recognizes individuals and teams from the military departments and defense agencies who have achieved significant improvements in interoperability, cost reduction, quality, reliability, and readiness through standardization. Since 1987, DSP has recognized these outstanding performers in a formal ceremony. This year's ceremony took place on March 14 in the Pentagon's Hall of Heroes. Mr. Greg Saunders, Director, DSPO, officiated the ceremony with help from Mr. Stephen Welby, Deputy Assistant Secretary of Defense, Systems Engineering.

Lisa Hoffer, the lead engineer for the Circular Connector Group, part of the Interconnection Branch at Defense Logistics Agency Land and Maritime, was the 2011 Distinguished Achievement Award winner for her work to develop alternative materials for plating electrical connectors that meet the same stringent corrosion resistance, system compatibility, durability, and electrical performance requirements as the widely used, but hazardous, cadmium finish. Ms. Hoffer received an engraved crystal Pentagon and a check for $5,000.

The remaining awards were presented to four teams and one individual:

- Army team from the BioTechnology Branch of the U.S. Army Edgewood Chemical Biological Center, for developing a quality management system to ensure the effectiveness of biological reagents
- Army team from the U.S. Army Research Laboratory, Weapons and Materials Research Directorate, for developing five new lightweight aluminum alloys with improved ballistic performance, corrosion resistance, and weldability

- Navy team, under the sponsorship of the Naval Sea Systems Command, for developing standardized advanced tank coatings that are of higher quality and reliability than the legacy coatings
- Dr. Jon Klauenberg, from the Air Force Research Laboratory, for his leadership, over 20 years, in the standardization of safety and occupational health practices related to electromagnetic fields
- DoD team from the Defense Medical Materiel Program Office, for developing a centralized, clinically driven process to standardize medical materiel through the collaborative selection of medical joint products of choice.

Distinguished Achievement Award Winner

Alternative Sustainable Plating for Electrical Connectors

Pictured above with the award winner's check are, left to right, Mr. Greg Saunders, Mr. Stephen Welby, Ms. Lisa Hoffer, Mr. Abdonasser Abdouni, and Col Ryan Kivett.

Distinguished Achievement Award Winner

Alternative Sustainable Plating for Electrical Connectors

Pictured above are, left to right, Mr. Stephen Welby, Ms. Lisa Hoffer, Mr. Abdonasser Abdouni, Col Ryan Kivett, Mr. Bill Lee, and Mr. Jim Jobe.

Achievement Award Winners

Quality Management System Ensures the Effectiveness of Biological Reagents

Pictured above are, left to right, Mr. Stephen Welby, Mr. Roy Thompson, Mr. Darrel Menking, Ms. Melody Zacharko, Ms. Heather Welsh, Dr. James Carney, and Mr. Bryant Allen.

Achievement Award Winners

New Lightweight Aluminum Alloys Qualify to Armor Military Vehicles

Pictured above are, left to right, Mr. Stephen Welby, Mr. Richard Squillacioti, Dr. Kevin Doherty, Mr. Denver Gallardy, and Mr. Bryant Allen.

Advanced Tank Coatings Reduce Costs and Enhance Fleet Readiness

Pictured above are, left to right, Mr. Greg Saunders, Mr. Stephen Welby, Mr. Robert Steele, Mr. Mark Browder, Mr. James Martin, Mr. Mark Ingle, Mr. Vernon Parrish, Mr. Edward Lemieux, Mr. Edward Godfrey, Mr. Ricardo Cabrera, and Mr. Christopher Paquette.

Achievement Award Winners

Improved EMF Standards Increase Personnel Safety

Pictured above are, left to right, Mr. Stephen Welby, Dr. B. Jon Klauenberg, Dr. Clarence Gooden, and Mr. John Heliotis.

New Office Centralizes DoD-Wide Standardization of Medical Materiel for DoD

Pictured above are, left to right, Mr. Stephen Welby, Col Laura Torres-Reyes, COL Colleen Shull, CAPT Robert Newell, CDR John Ware, and Dr. George Peach Taylor, Jr.

Events

Upcoming Events and Information

August 19–22, 2012, New Orleans, LA

SES—The Society for Standards Professionals Annual Conference

SES's 61st annual conference will be held at the Hyatt Regency in New Orleans, LA. The conference's theme is "Building the Future through Standards." For more information, please go to http://www.ses-standards.org/displayconvention.cfm.

August 27–30, 2012, New Orleans, LA

DMSMS and Standardization Conference

Mark your calendars now and plan to attend the 2012 Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Standardization Conference. This year's conference theme is "Agility, Affordability, and Efficiency under Uncertainty." The objective of the conference is to capture, understand, and institutionalize best practices in DMSMS and standardization to improve the ability of DoD program managers to proactively manage the obsolescence risk and sustainability for defense systems and to ensure mission readiness and operational effectiveness today and in the future. These best practices will significantly improve the ability of DoD program managers to manage the obsolescence risk for defense systems, thus increasing agility, affordability, and efficiency. Activities required to attain this goal include parts management, standardization, product support, total life-cycle management, value engineering, and counterfeit part mitigation.

This conference will present an opportunity to hear the views of government, military, and industrial leaders on what will be required to support the modern warfighter in the current environment and a forum to discuss the best programmatic, technical, and logistical approaches how collaboration between services and industry delivers rapid, affordable readiness.

As the conference planning develops, key information will be posted on the DMSMS and Standardization Conference website: http://www.dmsms2012.com.

October 11, 2012, Washington, DC

World Standards Day

The U.S. celebration of World Standards Day will take place on October 11, 2012, at the Fairmont Hotel in Washington, DC. This year's theme is "Standards Increase Efficiency." For more information about the 2012 World Standards Day celebration, exhibition, reception, and dinner, please go to http://www.ansi.org/meetings_events/WSW12/wsd.aspx?menuid=8.

People

People in the Standardization Community

Farewell

Jeff Ciesla, of the Defense Logistics Agency (DLA) Land and Maritime, Columbus, OH, accepted a position at the Defense Contract Management Agency, Phoenix, AZ. During his 11 years at DLA Land and Maritime as an electronics engineer in the Sourcing and Qualifications Division, he assessed and qualified manufacturers of printed wiring boards for both the qualified products list and qualified manufacturers list.

David Robinson, of DLA Land and Maritime, Columbus, OH, retired on April 30, 2012, with 30 years of federal service. Mr. Robinson started his federal service in the Engineering and Standardization Directorate with the former Defense Electronics Supply Center, Dayton, OH. For 5 years, he worked on microcircuits, tubes, safety of flight items, and PROM/ROM Program, and he managed hardness critical items. For the next 25 years, Mr. Robinson managed both the Diminishing Manufacturing Sources and Material Shortages (DMSMS) and Generalized Emulation of Microcircuit (GEM) programs. Mr. Robinson chaired the DoD DMSMS Outreach Committee for 10 years. He also was responsible for the first DMSMS training modules, now available online through the Defense Acquisition University. He taught more than 12,000 students how to manage and mitigate DMSMS-related issues.

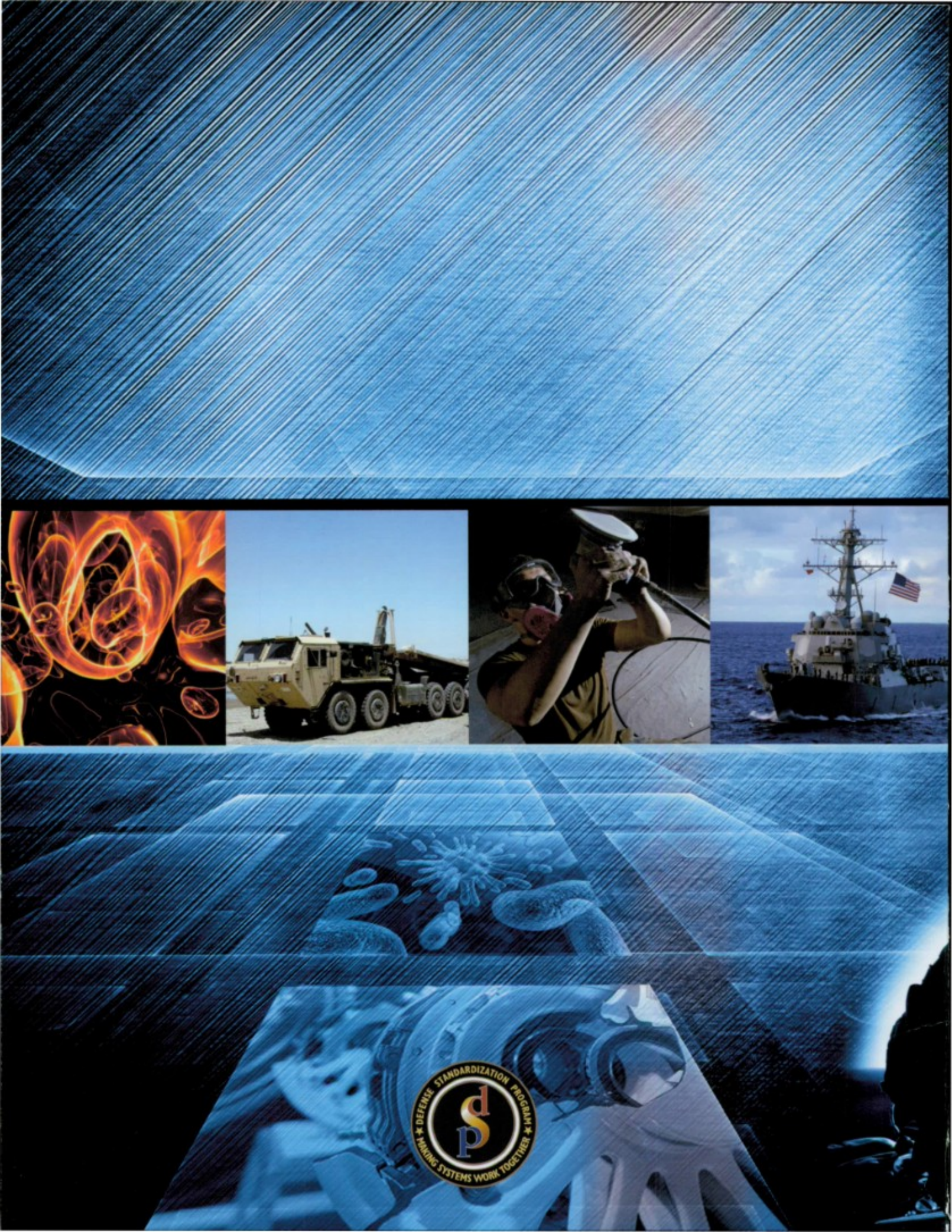
After 45 years of service to the government, **Rex Powell** retired from the U.S. Army Armament Research Development and Engineering Center (ARDEC), located at Picatinny Arsenal, NJ. Mr. Powell was a recognized subject matter expert in many of DSP's functional areas. Most notably, he served for more than 15 years as ARDEC's product qualification manager, ensuring that specific industrial products met all military specification requirements before being approved for use by DoD. One of his significant accomplishments was the qualification of weapons lubricants, resulting in the continued supply of DoD-approved weapons lubricants to the warfighter.

Upcoming Issues
Call for Contributors

We are always seeking articles that relate to our themes or other standardization topics. We invite anyone involved in standardization—government employees, military personnel, industry leaders, members of academia, and others—to submit proposed articles for use in the *DSP Journal*. Please let us know if you would like to contribute.

If you have ideas for articles or want more information, contact Tim Koczanski, Editor, *DSP Journal*, Defense Standardization Program Office, 8725 John J. Kingman Road, STOP 5100, Fort Belvoir, VA 22060-6220 or e-mail DSP-Editor@dla.mil.

Our office reserves the right to modify or reject any submission as deemed appropriate. We will be glad to send out our editorial guidelines and work with any author to get his or her material shaped into an article.


DEFENSE STANDARDIZATION PROGRAM
MAKING SYSTEMS WORK TOGETHER
dsp